SOUTH CAROLINA PUBLIC SERVICE COMMISSION
DOCKET NO. 1999-001-E
DIRECT TESTIMONY OF CAROLINA POWER & LIGHT COMPANY

WITNESS MICHAEL J. SETTLAGE

Q. Mr. Settlage, will you please state your full name, occupation, and address?

A. My name is Michael J. Settlage. I am employed by Carolina Power & Light Company as Superintendent - Power System Operations. My business address 411 Fayetteville Street Mall, Raleigh, North Carolina.

Q. Please summarize briefly your educational background and experience.

A. I graduated from Clemson University in 1984 with a B.S. Degree in Electrical engineering. I received a MS in Power Engineering from Clemson University in 1985. I received corporate research fellowships to support my thesis research in short-term power system load forecasting. I have authored or co-authored three (3) technical papers published by the IEEE on the subject of load forecasting. I joined CP&L in 1986 and have held several engineering and operating positions since then. These include: Senior Engineer in System Operations Planning, Senior Engineer in Dispatcher Training and Support, Senior System Load Dispatcher and Superintendent. In my current position, I am responsible for the economic and reliable operation of CP&L's power system which includes both the generation and transmission resources. I am currently CP&L's alternate member to the SERC Operating Committee. I am a member of the IEEE and received the Outstanding Engineer award for the Triangle Chapter of the IEEE in December, 1993.

Q. Have you previously presented testimony before the Commission?

A. Yes, I sponsored testimony in CP&L's last fuel case, Docket No. 98-001-E.

Q. What is the purpose of your testimony here today?

A. The purpose of my testimony is to review the historical operating performance of the Company's generating facilities during the period of January 1, 1998 through December 31, 1998 and the expected operating performance of the nuclear units for the projected period April 1, 1999 to March 31, 2000.

Q. Describe the types of generating facilities owned and operated by CP&L.

A. CP&L owns and operates a diverse mix of generating facilities consisting of hydro facilities, combustion turbines, fossil steam generating facilities, and nuclear plants.

Q. Why does CP&L utilize such a diverse mix of generating facilities?

A. Each type of facility has different operating and installation costs and is generally intended to meet a certain type of loading situation. In combination, the diversity of the system, in conjunction with power purchases made when doing so is more cost-effective than using a CP&L generating unit, allows CP&L to meet the continuously changing customer load pattern in a reasonable, cost-effective manner. The combustion turbines, which have relatively low installation costs but higher operating costs, are intended to be operated infrequently. They also provide resources that can be started in a relatively short time for emergency situations. In contrast, the large coal and nuclear steam generating plants have relatively high installation costs with lower operating costs, and are intended to operate in a manner to meet the constant level of demand on the system. Based on the load level that CP&L is called on to serve at any given point in time, CP&L selects the combination of facilities which will produce electricity in the most economical manner, giving due regard to

reliability of service and safety. This approach provides for overall minimization of the total cost of providing service.

Q. Please elaborate on the intended use of each type of facility CP&L uses to generate electricity.

A. As a general rule, peaking resources such as combustion turbines, are constructed with the intention of running them very infrequently, i.e. only during peak or emergency conditions. Therefore, as a rule, they have a very low capacity factor, generally less than 10%. Because combustion turbines can be started quickly in response to a sharp increase in customer demand, without having to continuously operate the units, they are very effective in providing reserve capacity. Intermediate facilities are intended to operate more frequently and are subject to daily load variations. Because these facilities take some time to come from a cold shut down situation, they are best utilized to respond to the more predictable system load patterns. Additionally, these plants, located across the Company's service territory, contribute to overall system reliability. As a rule, they operate with capacity factors in the range of 10% to 60%. CP&L's intermediate facilities are predominately older coal plants. Baseload facilities are intended and designed to operate on a near continuous basis with the exception of outages for required maintenance, modifications, repairs, major overhauls, or for refueling in the case of nuclear plants. These plants are traditionally called on to operate in the 60% and greater capacity factor range. CP&L's four nuclear units and four larger coal units constitute the Company's baseload facilities.

Q. How does CP&L ensure that it operates these three types of generating facilities as economically as possible?

A. The Company has a central Energy Control Center which monitors the electricity demands within the CP&L service area. The Energy Control Center regulates and dispatches available generating units in response to customer demand. Sophisticated computer control systems match the changing load with available sources of power. Personnel at the Energy Control Center, in addition to being in contact with the Company's generating plants, are also in communication with other utilities bordering our service territory. In the event a CP&L plant is suddenly forced off-line, the interconnections with neighboring utilities help to ensure that service to our customers will go uninterrupted. Additionally, it allows CP&L access to the unloaded capacity of neighboring utilities so that CP&L customers will be served by the lowest cost power available through inter-utility purchases.

Q. During the review period January 1, 1998 through December 31, 1998, did CP&L prudently operate its generating system within the guidelines discussed in regard to the three types of facilities?

A. Yes. Two different measures are utilized to evaluate the performance of generating facilities. They are equivalent availability factor and capacity factor. Equivalent availability factor refers to the percent of a given time a facility was available to operate at full power if needed. Capacity factor measures the generation a facility actually produces against the amount of generation that theoretically could be produced in a given time period, based on its maximum dependable capacity. Equivalent availability factor describes how well a facility was operated, even in

cases where the unit was used in a load following application. CP&L's combustion turbines averaged 87.9% equivalent availability for the twelve-month review period ending in December 1998, and only 3.5% capacity factor indicating that they were almost always available for use but operated minimally. This is consistent with their intended purpose. CP&L's intermediate, or cycling units, had an average equivalent availability factor of 89.9% and a capacity factor of 58%, again indicative of good performance and management. CP&L's fossil baseload units had an average equivalent availability of 86.5% and a capacity factor of 65.2%. Thus, the fossil baseload units were well managed and operated. CP&L's nuclear generation system achieved a net capacity factor of 91.9% for the twelve month review period. Excluding outage time associated with reasonable refueling outages, the nuclear generation system's net capacity factor rises to approximately 99.3%. Excluding all reasonable outage time further raises the net capacity factor to 102.1%. Therefore, pursuant to S.C. Code Ann. § 58-27-865(F), since the adjusted capacity factor exceeds 92.5% CP&L is presumed to have made every reasonable effort to minimize the cost associated with the operation of its nuclear generation system and to have properly operated and managed its nuclear facilities.

Q. How did CP&L's nuclear production in 1998 compare to previous years?

A. CP&L's nuclear generating plants set all-time Company records during 1998, producing over 25.5 million megawatt-hours and providing 46% of the total electric generation. The Brunswick plant near Southport, NC set a station generating record during the year. This is the fifth consecutive year the CP&L nuclear units have set a new total nuclear generation record.

Q. You have not specifically addressed the performance of CP&L's hydro units. Please discuss their performance.

A. The usage of the hydro facilities on the CP&L system is limited by the availability of water that can be released through the turbine generators. The Company's hydro plants have very limited ponding capacity for water storage. CP&L operates the hydro plants to obtain the maximum generation from them; but because of the small water storage capacity available, the hydro units have been primarily utilized for peaking and regulating purposes. This maximizes the economic benefit of the units. For the review period the hydro units had an equivalent availability of 99.1% and operated at a capacity factor of 41.4%.

Q. How did the Company's fossil units perform as compared to the industry?

A. Our fossil steam system operated well during this review period, achieving an equivalent availability of 88.1%. This exceeds the most recently published NERC average equivalent availability for coal plants of 83.3%. The NERC average covers the period 1993-1997 and represents the performance of 926 units. Equivalent availability is a more meaningful measure of performance for coal plants than capacity factor because the output of our fossil units varies significantly depending on the level of system load. Our larger fossil units, Roxboro Units 2, 3, and 4 and Mayo Unit 1, operated at equivalent availabilities of 90.7%, 72.2%, 91.9%, and 91.1%, respectively. As I mentioned earlier, the baseload coal units achieved an average equivalent availability of 86.5%.

Q. How did the performance of CP&L's nuclear system compare to the industry average?

A. During the historic period January 1, 1998 through December 31, 1998, CP&L's pressurized water reactors ("PWRs"), Robinson Unit 2 and Harris Unit 1, achieved capacity factors of 92% and 89% respectively. On average, these nuclear units operated at a 90% capacity factor during the test period. In contrast, the NERC five-year average capacity factor for 1993-1997 for all commercial PWRs in North America was 76%. Brunswick Units 1 and 2, which are both boiling water reactors ("BWRs"), achieved capacity factors of 88% and 98%, with an average of 93%. The NERC five-year capacity factor average for 1993-1997 for all BWRs was 66.3%. CP&L's nuclear system incurred only a 0.6% forced outage rate during the test period compared to the industry average of 10.8%.

Q. Are you presenting any exhibits with your testimony?

A. Yes. Settlage Exhibit 1 is a graphic representation of the Company's generation system operation for the twelve-month review period.

Q. Please describe the projected performance of CP&L's nuclear system for the time period April 1, 1999 through March 31, 2000.

A. Including the impact of planned refueling outages, I project that CP&L's nuclear units will achieve an average net capacity factor of 89% during this period.

Q. Does this conclude your testimony?

A. Yes.

Carolina Power and Light Company

1998 Generation Mix